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## Concealed yellow pigment in the breeding plumage of some weavers

by C. J. O. HARRISON

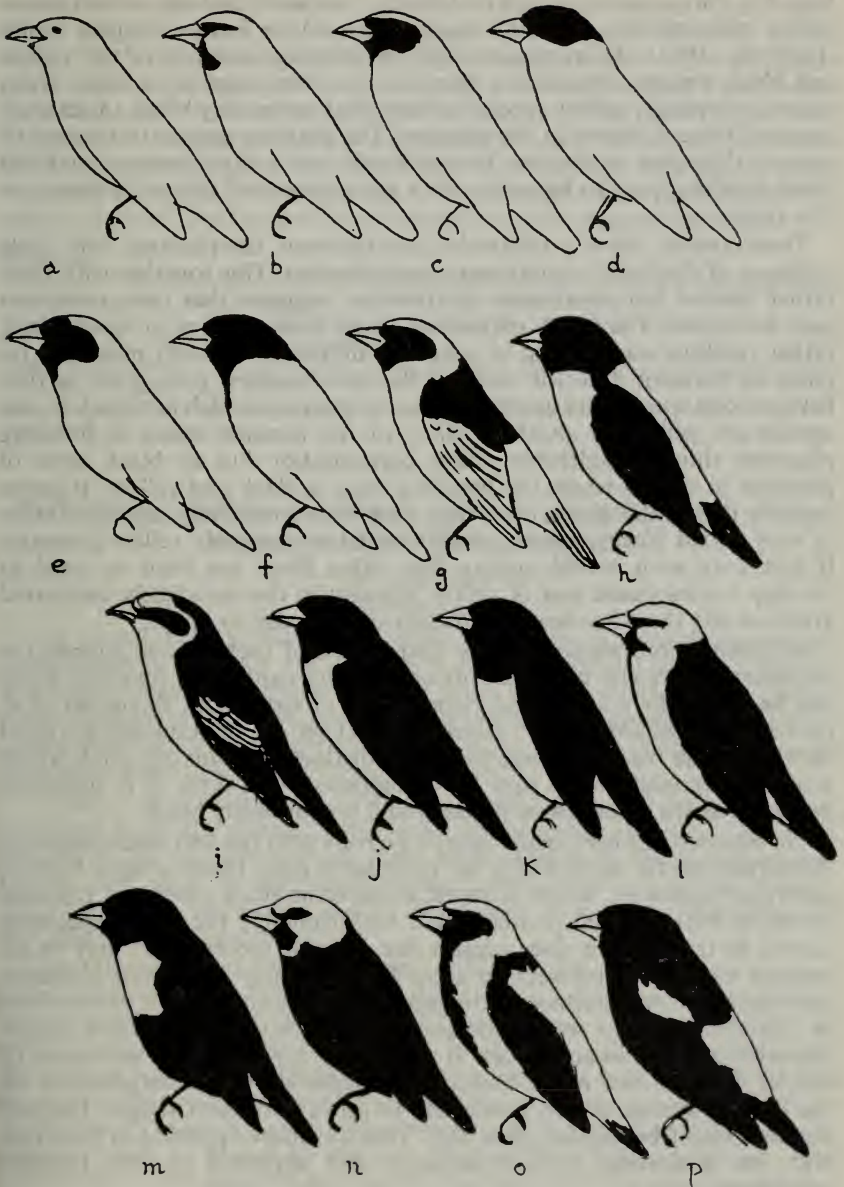
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The males of a large number of weaver species (Ploceidae) in Africa have a breeding plumage patterned in yellow and black. In *Ploceus melanogaster* (Fig. n) the male is almost entirely black, the head only being deep yellow with a black streak through the eye, and a black throat separated from the similarly coloured under side by a narrow golden band. A male of this species showing an interesting example of partial non-melanism was collected by the Rev. W. Serle in British Cameroons on 29th March, 1948. This bird has lost the black throat patch and has a clear yellow throat with a narrow black border in places. The belly, under tail-coverts and posterior flanks are entirely light yellow: there are a few yellow feathers on the rump. Most of the primaries on the right wing and some on the left wing are yellow and pale buff, as are some of the tail feathers, the presence of buff suggesting that some of the phaeomelanin has been retained in places. Some of the right wing-coverts are white with a yellow border, and a few have a black border, a narrow yellow zone inside that, and a white centre. Most of the feathers of wings, mantle and breast show a reduction of melanin towards the base, and where melanin is reduced on mantle and breast there is evidence of yellow pigment.

A specimen of *Euplectes capensis* described above by Sage appears to be a similar example of reduction of melanin in parts which are normally black, revealing the presence of yellow pigment.

Examples of total loss of melanin in the Ploceidae appear to be rare. A non-melanic specimen of *Ploceus jacksoni* was collected by C. W. Chorley in Uganda on 12th May, 1928 and is in the collection of the British Museum (Natural History) (Reg. No. 1929. 1. 7. 43). This is a male and is entirely yellow. The colour is very intense on wings and tail, less so on the breast and sides of the head, while the remainder of the plumage, including the mantle, is very pale. Since males in breeding plumage have an intensely golden mantle it is suspected that this specimen is in the non-breeding plumage in which the mantle pigment would be mainly melanin, giving a dark-streaked olive green colour in the normal bird. This is presumably the specimen which gave rise to the reference to xanthochroic examples by Mackworth-Praed and Grant (1955). It has been suggested that the terms Xanthic and Xanthochroic are not valid for plumages of this type, which should more correctly be called non-melanic (Harrison 1963).

The evidence of these specimens suggests that in this family there is a tendency for yellow pigment to be present not only in those parts of the plumage where it may have some signal value in epigamic displays, but also where it is masked by heavily melanized plumage. It is not the case in all black and yellow pigmented species, for in non-melanic forms of the



Diagrammatic representation of the breeding plumages of some yellow and black weavers.

(a) *Ploceus xanthops*. (b) *P. ocularis*. (c) *P. spekeoides*. (d) *P. stuhlmanni*. (e) *P. pelzelni*. (f) *P. alienus*. (g) *P. nigrimentum*. (h) *P. insignis* ♀. (i) *P. reichenowi*. (j) *P. bicolor*. (k) *P. golandi*. (l) *P. nigricollis*. (m) *Malimbus racheliae*. (n) *P. melanogaster*. (o) *Euplectes afra*. (p) *E. capensis*.

Blue Tit, *Parus caeruleus*, and Goldfinch, *Carduelis carduelis*, which retain yellow pigment, the normally black areas of the feathers appear white (Harrison, 1963). An examination of the plumage patterns of the yellow and black weavers reveals that they show a wide range of variation from almost completely yellow species to birds that are mainly black. A selected range of these is shown in the diagram. The patterns appear too varied to suggest divergent evolution from a black and yellow pattern, and the trend would appear to be rather for a replacement of yellow by black, or *vice versa*.

These species have a relatively homogeneous morphology with little evidence of divergent evolutionary specialisation. This together with their rather limited but continuous distribution suggests that their evolution may be recent. The black patterning varies from species to species in a rather random manner and in some the difference between male and female, or between different races of the same species, is as great as that between one species and another. Areas of plumage which are black in one species are yellow in another. Many of the females, when in breeding plumage, show considerable yellow pigmentation but no black areas of plumage in species where the breeding male is black and yellow. It seems possible that in this group there may have been a relatively rapid evolution of very varied black patterns superimposed on a mainly yellow plumage. If this were so it would appear that either there has been no need to develop a subsequent loss of yellow pigment in the completely melanized areas, or else there has been insufficient time for this to occur.

Additional information on the distribution of such hidden pigments is necessary before any more definite conclusions can be put forward. Some can be gained by a superficial examination of specimens. Examples of *P. reichenowi*, *P. bicolor*, and *P. melanogaster* (Figs. i, j, n) examined in a good light show the black plumage to have a distinct but faint olive tint, which was more apparent when they were compared with skins of *P. albinucha maxwelli* which lacks yellow pigment and is completely black.

No mention has been made here of weavers with red and black plumage. Winterbottom (in Sage, 1962) has recorded a male Black-winged Bishop, *Euplectes hordeacea*, which is stated to have the black markings replaced by white while the red is unaffected. Unfortunately the actual specimen cannot be traced. This does suggest that in some species there may be no masked carotenoid pigment in areas of completely melanized plumage, and this might relate either to the extent to which the pattern had evolved in this species or to some difference in the reaction of red and yellow pigments in such circumstances. It was found, however, that specimens of species with red and black breeding plumages showed a purplish tint on the black plumage of the under side to an extent which suggest that red pigment might be present there also. This was more apparent in *Euplectes orix*, less noticeable in *E. hordeacea* and appeared to vary between individuals.

Concealed pigments of this type do not appear to be mentioned in most pigment studies. Dr. L. Auber refers to a carotenoid masked by melanin in the dark head-markings of *Merops apiaster* (Auber, 1958), and also states (pers. comm.) that a similar concealed pigmentation seems to occur in parts of the plumage in some parrots *Platyercus* spp. and Turacos *Musophaga* spp. The pigmentation in the Budgerigar *Melopsittacus*

*undulatus*, seems a little more complex. In the non-melanistic specimen on which the statements in an earlier paper (Harrison, 1963) were based, many feathers, particularly the wing-coverts, appear white on those portions where melanin is absent, although a closer inspection has revealed very slight traces of yellow. An examination of other specimens shows that there is a range of variation from this to individuals in which such feathers appear almost uniformly yellow. It is not clear which type would represent a simple loss of melanin since the specialised breeding of this species in captivity has produced variations in pigmentation intensity.

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## ***Pycnonotus plumosus* subsp. with the description of a new subspecies from Bawean Island**

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It is known that in museum material of this species, as with *Pycnonotus simplex* and *P. brunneus*, the plumage is subject to fading and discolouring to such an important degree that we must be very cautious and critical when comparing old skins with freshly obtained material. Also it is of outstanding importance to take into account the age of the skins to be compared when looking for racial characters.

Together with a collection of about 50 fresh skins, for the greater part obtained from the Sunda Strait area and Bawean Island, I critically studied all old material present in the Bogor Museum. Because when describing new races or discussing existing ones of this particular species, much stress has often been laid on differences in wing size, full attention was also paid to such details.

Stressmann<sup>9</sup> states that *hutzi* is smaller (wing: 78-84 mm. in two adult males and three females) than *insularis* (= *hachisukae*) but we found a wing length of 80-86 mm. in eight *hutzi* against 77-90 in 29 *plumosus* and Chasen and Boden Kloss<sup>5</sup> give 79-90 mm. as a wing length for *hachisukae*, so that the difference in wing size between *plumosus*, *hutzi* and *hachisukae* seems not very convincing. The subspecies *porphyreus* (wing: 77-91.5 mm.) and *billitonis* (wing: 79-86 mm.) fit well within the wing measurements as found by me for 29 specimens of the nominate race (77-90 mm.). The same holds good for the material of this species collected within the areas in and around the Sunda Strait and on the island of Bawean with wings of 77-90 and 82-90 mm. respectively. But Bawean birds average smaller in the bill and have a longer tail.

Rather large in all their measurements are the few specimens from the Riouw Islands which I examined and they are rather light in plumage making them worth a further study when more material becomes available.